# OUTLINES
OF
# CLASSIFICATION.

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# OUTLINES

OF

# CLASSIFICATION OF PLANTS,

BY

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NOTE

# OUTLINES OF CLASSIFICATION.

## Synopsis.

### Branch I.—Protophyta.

Class 1.—Myxogastres, (Slime Moulds.)

*Orders*—Peritricheæ.
Columelliferæ.
Lithodermeæ.
Calotricheæ.

Class 2.—Schizomycetes, (Fission Fungi.)

*Orders*—Myxobacteriaceæ.
Cystiphoræ.
Nematogeneæ.

From the nature of the organisms included in the protophyta, it is improbable that many of them will ever be found in the fossil state, although Renault claims to have recognized several species of bacteria in the tissues of carboniferous plants.

### Branch II.—Thallophyta.

Class 3.—Ascomycetes, (Sac Fungi.)

*Orders*—Perisporiaceæ.
Tuberaceæ.
Pyrenomyceteæ.
Discomyceteæ.
Uredineæ.
Ustilagineæ.
Sphæropsideæ.
Melanconieæ.
Hyphomyceteæ.

Fossil representatives occur in the carboniferous and later formations, chiefly upon leaves and in lignite.

Class 4.—Basidiomycetes, (Higher Fungi.)

*Orders*—Gasteromyceteæ.
Hymenomyceteæ.

Fossil representatives occur in the carboniferous, *Grilletia sphærospermii*, *Gasteromyces farinosus*, etc.

Class 5.—Chlorophyceæ, (Green Algæ.)

*Orders*—Protococcoideæ.
Conjugatæ.
Siphoneæ.
Confervoideæ.

Fossil representatives, in the form of siliceous diatom valves, are especially abundant in the Tertiary and Quaternary, often forming extensive deposits known under the name of infusorial earth.

Class 6.—Phæophyceæ, (Brown Algæ.)

*Orders*—Phæosporeæ.
Dictyoteæ.
Fucoideæ.

The earliest fossil representatives of the brown algæ occur in the Upper Silurian whence they pass into the Lower Devonian. They appear in these early formations as plants of great size (*Nematophyton*), indicating that they must also have flourished at much earlier periods, but the remains of the vegetation which existed prior to the Upper Silurian are now represented only by a carbonaceous residue in the form of graphite. Phæophyceæ are found more or less abundantly in all the later formations, and the genus Fucus is well defined in the Cretaceous.

Class 7.—Coleochæteæ.

*Order*—Coleochætaceæ.

No fossil representatives known.

Class 8.—Rhodophyceæ.

*Order*—Florideæ.

Fossil representatives from the Silurian upward, and especially abundant in the Cretaceous.

Class 9.—Charophyceæ.

*Order*—Characeæ.

Represented by many species in the lower Cretaceous, in the Tertiary and Quaternary.

## Synopsis.—(*Continued.*)

NOTE:

### Branch III.—Bryophyta.

CLASS 10.—HEPATICÆ.

*Orders*—Jungermanniaceæ.
Ricciaceæ.
Anthocerotaceæ.
Marchantiaceæ.

Found only in recent formations—Tertiary and Quaternary. *Marchantia.*

CLASS 11.—MUSCINÆ.

*Orders*—Sphagnaceæ.
Andreaceæ.
Phascaceæ.
Bryaceæ.

Fossils found only in the Tertiary and Quaternary. *Gymnostomum, Sphagnum, Hypnum.*

### Branch IV.—Pteridophyta.

CLASS 12.—FILICINÆ.

*Orders*—Filices.
Salviniaceæ.
Marsiliaceæ.
Ophioglossaceæ.
Marattiaceæ.

Fossil representatives numerous from the Devonian (*Parka, Protosalvinia, Neuropteris, Sphenopteris, etc.*) through the carboniferous to recent formations.

CLASS 13.—EQUISETINÆ.

*Orders*—Equisetaceæ.
Calamitæ.
Annularieæ.
Asterophyllitæ.

Fossil representatives numerous from the Devonian (*Calamites, Asterophyllites, etc.*) and throughout the carboniferous.

CLASS 14.—SPHENOPHYLLEÆ.

*Order*—Sphenophyllaceæ.

Fossil representatives in the Siluro-Cambrian and upward.

CLASS 15.—LYCOPODINÆ.

*Orders*—Lycopodiaceæ.
Psilotaceæ.
Selaginellaceæ.
Isoetaceæ.

Fossil representatives numerous and often very large, from the Upper Silurian (*Psilophyton, etc.*) through the Devonian (*Lepidodendron*) and Carboniferous.

### Branch V.—Spermaphyta.

CLASS 16.—GYMNOSPERMÆ.

*Orders*—Cycadaceæ.
Coniferæ.
Taxaceæ.
Gnetaceæ.

Fossil representatives very numerous from the Devonian (*Dadoxylon, Cordaites, etc.*) and through the Carboniferous and more recent formations.

CLASS 17.—ANGIOSPERMÆ.

*Sub Class* 1.—Monocotyledons.
*Sub Class* 2.—Dicotyledons.

Orders numerous.

Fossil representatives are very numerous as leaves, lignite, &c., from the Permian upward, becoming more numerous in recent formations.

# Branch I.—Protophyta.

Unicellular Plants often forming more or less extensive gelatinous plasmodia by coalescence.

No well defined separation of sexual and asexual phases of growth

## Class I.—Myxogastres.

(Slime Moulds.)

*Orders.*

1. Peritricheae
2. Columelliferae
3. Lithodermeae
4. Calotricheae.

Asexual reproduction predominant.

Saprophytic plants devoid of a cell wall except in the spores. Reproduction through amœboid swarm spores, asexual by simple fission, or sexual (?) (Goebel) by conjugation and the formation of plasmodia, from which asexual spores arise.

## Class II.—Schizomycetes.

(Fission Fungi.)

*Orders.*

1. Myxobacteriaceae
2. Cystophorae
3. Nematogenae.

Asexual reproduction predominant.

Parasitic or saprophytic plants sometimes forming gelatinous plasmodia. Reproduction wholly asexual by simple division of a mother cell, more rarely by endogenous spore formation.

NOTE

## BRANCH II.–Thallophyta.

Unicellular or multicellular plants, the latter often with a stem-like habit of growth.
Sexual generation predominant.

| | III. ASCOMYCETES (Sac Fungi.) | IV. BASIDIOMYCETES. (Higher Fungi.) | V. CHLOROPHYCEÆ (Green Algæ.) | VI. PHÆOPHYCEÆ (Brown Algæ.) | VII. C[illegible] |
|---|---|---|---|---|---|
| | *Orders.*<br>1. Perisporiaceæ.<br>2. Tuberoideæ.<br>3. Pyrenomyceteæ.<br>4. Discomyceteæ.<br>5. Uredineæ.<br>6. Ustilagineæ.<br>7. Sphæropsideæ.<br>8. Melanconieæ.<br>9. Hyphomyceteæ. | *Orders.*<br>1. Gasteromyceteæ.<br>2. Hymenomyceteæ. | *Orders.*<br>1. Protococcoideæ.<br>2. Conjugatæ.<br>3. Siphoneæ.<br>4. Confervoideæ. | *Orders.*<br>1. Phæosporeæ.<br>2. Dictyoteæ.<br>3. Fucoideæ. | *Order.*<br>1. Coleochætaceæ. |
| | Asexual reproduction commonly predominant. | Asexual reproduction predominant. | Sexual reproduction often by conjugation with the formation of Zygospores. Asexual reproduction predominant. | Reproduction wholly sexual in Fucaceæ, asexual in Phæosporeæ and Dictyoteæ. | Asexual reproduction by swarm-spores predominant. |
| Oophyte Generation. (Sexual Phase.) | 1. Perfect plant ☿.<br>2. Antheridia ♂. | | 1. Perfect plant ♂<br>2. Antheridia ♂<br>3. Spermatozoids. | 1. Perfect plant ♂ or ☿<br>2. Antheridia ♂<br>3. Spermatozoids. | 1. Perfect plant ♂<br>2. Antheridia ♂<br>3. Spermatozoids. |
| Alternation of generations often well defined | 1. Perfect plant ☿.<br>II. Archicarps ♀. | No clearly defined sexual reproduction known. | I. Perfect plant ♀<br>II. Oogonium.<br>III. Oosphere (Ovum.) | I. Perfect plant ♀ or ☿<br>II. Oogonia.<br>III. Oospheres (Ova). | I. Perfect plant ♀<br>II. Oogonium.<br>III. Oosphere (Ovum.) |
| Sporophyte Generation (Asexual Phase.) | 3 x III. Ascus.<br>4 x IV. Spores. | | 4 x IV. Oospore.<br>5 x V. Swarm spores. | 4 x IV. Oospore. | 4 x IV. Oospore.<br>5 x V. Swarm spores. |

## Thallophyta.—(*Continued.*)

## Branch III—Bryophyta.

Cellular plants with roots, epidermis and stomata,
often with leafy stems.
Sexual generation predominant

NOTES

| VIII. Rhodophyceæ. (Red Seaweeds.) | IX. Charophyceæ. | | X. Hepaticæ. (Liverworts.) | XI. Musci. (Mosses.) |
|---|---|---|---|---|
| *Order.*<br>1. Florideæ. | *Order.*<br>1. Characeæ. | | *Orders.*<br>1. Jungermanniaceæ.<br>2. Ricciaceæ.<br>3. Anthocerotaceæ.<br>4. Marchantiaceæ. | *Orders.*<br>1. Sphagnaceæ.<br>2. Andreaceæ.<br>3. Phascaceæ.<br>4. Bryaceæ. |
| Asexual reproduction often predominant by means of tetragonidia. | Asexual reproduction often predominant by means of bulbils, or tubers, or special vegetative branches. | | Asexual reproduction often predominant, by means of simple separation of the vegetative axis, by adventitious shoots or by gemmæ. | Asexual reproduction predominant by the development of a protonema, more rarely through gemmæ. |
| 1. Perfect plant ☿ or ♀ ♂<br>2. Spermogonia.<br>3. Spermatia ♂ | 1. Perfect plant ☿<br>2. Antheridium ♂<br>3. Spermatozoids motile | Oophyte Generation. (Sexual Phase.) | 1. Perfect plant ☿ or ♂<br>2. Antheridia ♂<br>3. Spermatozoids motile. | 1. Perfect plant ☿ or ♂<br>2. Antheridia ♂<br>3. Spermatozoids motile. |
| I. Perfect plant ☿ or ♀<br>II. Procarp<br>III. Trichogyne. | I. Perfect plant ☿<br>II. Oogonium.<br>III. Oosphere. | | I. Perfect plant ☿ or ♂ ♀<br>II. Archegonium.<br>III. Oosphere (Ovum). | I. Perfect plant ☿ or ♀<br>II. Archegonium.<br>III. Oosphere (Ovum). |
| 3 x III. Carpospores.<br>4 x IV. Protonema. | 4 x IV. Oospore.<br>5 x V. Pro-embryo. | Sporophyte Generation. (Asexual Phase.)<br>Alternation of generations well defined. | 4 x IV. Oospore.<br>5 x V. Embryo rudimentary.<br>6 x VI. Sporogonium parasitic upon the sexual generation.<br>7 x VII. Spores with elaters.<br>8 x VIII. Protonema. | 4 x IV. Oospore.<br>5 x V. Embryo rudimentary.<br>6 x VI. Sporogonium parasitic upon the sexual generation.<br>7 x VII. Spores.<br>8 x VIII. Protonema. |

BRANCH IV. Pter

Plants with a

(Vascular

Sexual generation

| Alternation of generations often well defined | XII.—FILICINÆ (Ferns) | | | XIII.—EQUISETINÆ (Horsetails) | |
|---|---|---|---|---|---|
| | A. Leptosporangiatæ | | B. Eusporangiatæ | Homosporous. | Heterosporous. |
| | 1. Homosporous. | 2. Heterosporous. | 3. Homosporous. | | |
| | Orders. | Orders. | Orders. | Orders. | Orders. |
| | 1. [illegible] | 1. Salviniaceæ | 1. Ophioglossaceæ | 1. Equisetaceæ | 1. Annularieæ |
| | [illegible] | 2. Marsiliaceæ | 2. Marattiaceæ | 2. Calamitaceæ | 2. Asterophyllitæ |
| | | Asexual reproduction [illegible] subordinate. | Asexual reproduction often subordinate, by means of adventitious buds on the roots. | Asexual reproduction subordinate by means of tubers. | |
| Oophyte Generation. (Sexual Phase.) | 1. Prothallus ♀ well formed. | 1. Prothallus ♀ well formed. | 1. Prothallus ♀ well formed. | 1. Prothallus ♀ well developed. | Represented by fossil forms only. The succession as in the heterosporous Lycopodinæ. |
| | 2. Antheridium ♂ | 2. Antheridium. | 2. Antheridium ♂ | 2. Antheridium ♂ | |
| | 3. Spermatozoids motile. | 3. Spermatozoids. | 3. Spermatozoids motile | 3. Spermatozoids motile | |
| Sporophyte Generation. (Asexual Phase.) | 1. Prothallus ♀ well formed. | 1. Prothallus ♀ well formed. | 1. Prothallus ♀ well formed | 1. Prothallus ♀ well developed | |
| | II. Archegonium. | II. Archegonium. | II. Archegonia | II. Archegonium | |
| | III. Oosphere (Ovum) | III. Oosphere (Ovum) | III. Oosphere (Ovum) | III. Oosphere (Ovum) | |
| | 4 x IV. Oospore. | 4 x IV. Oospore. | 4 x IV. Oospore. | 4 x IV. Oospore. | |
| | 5 x V. Embryo rudimentary. | 5 x V. Embryo rudimentary. | 5 x V. Embryo rudimentary. | 5 x V. Embryo rudimentary. | |
| | 6 x VI. Normal plant. | 6 x VI. Normal plant. | 6 x VI. Normal plant. | 6 x VI. Normal plant. | |
| | 7 x VII. Sporophyll. | 7 x VII. Sporophyll. | 7 x VII. Sporophyll. | 7 x VII. Scales of fertile spike. | |
| | 8 x VIII. Sporangia. | 8 x VIII. Sporangia [illegible] and [illegible] | 8 x VIII. Sporangia. | 8 x VIII. Sporangia. | |
| | 9 x IX. Spores. | 9 x IX. Spores [illegible] and [illegible] | 9 x IX. Spores. | 9 x IX. Spores with elaters. | |

# idophyta.

distinct Vascular System.
Cryptogams.)
subordinate.

NOTES

| XIV. SPHENOPHYLLEÆ. | XV. LYCOPODINÆ.<br>(Club Mosses.) | | |
|---|---|---|---|
| Heterosporous. | Homosporous or Heterosporous, the latter fossil only. | Homosporous. | Heterosporous. |
| *Order.*<br>1. Sphenophyllaceæ. | *Order.*<br>1. Lycopodiaceæ | *Order.*<br>1. Psilotaceæ. | *Orders.*<br>1. Selaginellaceæ.<br>2. Isoetaceæ. |
| | Asexual reproduction subordinate, by means of axillary bulbils, or by lateral budding of underground tubers. | Sexual reproduction predominant. | Asexual propagation subordinate, by division of the main axis, rarely by apogamy |
| Represented by fossil forms only. The succession as in the heterosporous Lycopodinæ. | 1. Prothallus ☿ or ♂, rudimentary.<br>2. Antheridium ♂<br>3. Spermatozoids motile. | 1. Prothallus ♂ rudimentary.<br>2. Antheridium ♂<br>3. Spermatozoids motile. | 1. Prothallus ♂ rudimentary.<br>2. Antheridium<br>3. Spermatozoids motile |
| | I. Prothallus ☿ or ♂, rudimentary.<br>II. Archegonium ♀<br>III. Oosphere (Ovum.) | I. Prothallus rudimentary.<br>II. Archegonium<br>III. Oosphere (Ovum). | I. Prothallus rudimentary.<br>II. Archegonium<br>III. Oosphere (Ovum). |
| | | | 4. Oospore.<br>5. Suspensor.<br>6. Embryo rudimentary.<br>7. Normal plant.<br>8. Sporangiferous leaf.<br>9. Microsporangia.<br>10. Microspores. |
| | 4 x IV. Oospore.<br>5 x V. Suspensor.<br>6 x VI. Embryo rudimentary.<br>7 x VII. Normal plant.<br>8 x VIII. Sporangiferous leaf.<br>9 x IX. Sporangium.<br>10 x X. Spores. | 4 x IV. Oospore.<br>5 x V. Suspensor.<br>6 x VI. Embryo rudimentary.<br>7 x VII. Normal plant.<br>8 x VIII. Sporangiferous leaf.<br>9 x IX. Sporangium.<br>10 x X. Spores. | IV. Oospore.<br>V. Suspensor.<br>VI. Embryo rudimentary.<br>VIII. Sporangiferous leaf<br>VII. Normal plant.<br>IX. Macrosporangia.<br>X. Macrospores. |

## BRANCH V.—Spermaphyta.

NOTES

True seed plants.

Sexual generation very subordinate, in the Dicotyledons becoming almost completely suppressed with respect to the general structure.

| XVI.—GYMNOSPERMÆ. | XVII.—ANGIOSPERMÆ. | |
|---|---|---|
| Carpels open, seeds naked. | Carpels forming closed seed vessels | |
| Heterosporous; prothalli two ♀ ♂. | Heterosporous, the rudimentary prothalli often wanting. | |
| | 1. Monocotyledons. | 2. Dicotyledons. |
| Orders.<br>1. Cycadaceae. 2. Coniferæ.<br>3. Taxaceæ. 4. Gnetaceæ. | Orders numerous. | Orders numerous. |
| Asexual propagation subordinate; sometimes by tubers. | Asexual propagation subordinate, rarely wholly replacing the sexual; varied, by means of runners, stolons, offsets, bulbs, suckers, tubers, and rarely by parthenogenesis. | |

| | | | | |
|---|---|---|---|---|
| Alternation of generations clearly defined. | Oophyte Generation (Sexual Phase) | 1. Prothallus rudimentary. ♂<br>2. Antheridium rudimentary. (Pollen tube.)<br>3 Spermatozoids none. (Protoplasm of the antheridium.) | 1. Prothallus not developed.<br>2. Antheridium rudimentary. (Pollen tube )<br>3. Spermatozoids none. (Protoplasm of the antheridium.) | 1. Prothallus not developed.<br>2. Antheridium rudimentary. (Pollen tube.)<br>3. Spermatozoids none. (Protoplasm of the antheridium.) |
| | | I. Prothallus ♀ (endosperm), formed before impregnation; parasitic upon the asexual generation. (Seeds albuminous )<br>II. Archegonium well formed.<br>III. Oosphere (Ovum.) | I. Prothallus (endosperm), formed only after impregnation of the ovum; parasitic upon the asexual generation. (Seeds albuminous.)<br>II. Archegonium not formed.<br>III. Oosphere (Ovum. Germ cell.) | I. Prothallus (endosperm) formed only after impregnation of the ovum, generally obliterated. (Seeds exalbuminous )<br>II. Archegonium not formed.<br>III Oosphere (Ovum or Germ cell.) |
| | Sporophyte Generation. (Asexual Phase ) | 4. Oospore.<br>5. Suspensor.<br>6 Embryo with 2 to several cotyledons.<br>7. Normal plant.<br>8. Anthophylla.<br>9. Microsporangia (Anthers.)<br>10. Microspores (Pollen.) | 4. Oospore.<br>5. Suspensor.<br>6. Embryo with one cotyledon.<br>7. Normal plant.<br>8. Stamens.<br>9. Microsporangia (Anthers.)<br>10. Microspores. (Pollen.) | 4. Oospore.<br>5. Suspensor.<br>6. Embryo with two cotyledons.<br>7. Normal plant.<br>8. Stamens.<br>9. Microsporangia ( Anthers )<br>10 Microspores. (Pollen ) |
| | | IV. Oospore.<br>V. Suspensor.<br>VI. Embryo with 2 to several cotyledons<br>VII. Normal plant.<br>VIII. Carpophyllum.<br>IX. Macrosporangia (Ovules.)<br>X Macrospore (Embryo sac.) | IV. Oospore.<br>V. Suspensor.<br>VI. Embryo with one cotyledon.<br>VII. Normal plant.<br>VIII. Pistil.<br>IX. Macrosporangia (Ovules )<br>X. Macrospore (Embryo sac.) | IV. Oospore.<br>V. Suspensor.<br>VI. Embryo with two cotyledons.<br>VII. Normal plant.<br>VIII. Pistil.<br>IX. Macrosporangia (Ovules )<br>X. Macrospore (Embryo sac ) |